Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 4, 2021, Pages. 7359 – 7365
Received 05 March 2021; Accepted 01 April 2021.

The Role of Artemisia Herba-Alba in Treatment of Kidney Disorders that Induced by Cell Wall of Enterobacter Cloacae Rats

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Abstract

The current work was aimed to exhibited the role of *A. herba-alba* to enhance the antioxidant state after treated the rats with cell wall of E. cloacae. The work utilized 20 rats that distributed to five groups (each group consist 5 rats); control group that received normal saline, rat received (orally) with 50u/ml of cell wall extract. rat received (orally) 50u/ml of cell wall extract and treated with 50mg/kg of leaves extract. Rat received (orally) with 50u/ml of cell wall extract and treated with 100mg/kg of leaves extract. The findings revealed significant ($P < 0.05$) elevate in MDA with reduce in levels GSH and catalase in rat received (orally) with 50u/ml of cell wall extract compare with control rat. The findings of treated rats exhibited non-significant ($P < 0.05$) changes oxidative state compare with control rat. Histological, kidney slides exhibited thickening wall of blood vessels, hemorrhage with fibrosis in kidney of rat received (orally) with 50u/ml of cell wall extract. After treatment with leaves extract, kidney back to semi-normal state. It was concluded that *A. herba-alba* has antioxidant activities.

Keywords: *Artemisia herba-alba*; *Enterobacter cloacae*; oxidative stress; antioxidant.

Introduction

The plant called *Artemisia herba-alba* (family Asteraceae) is typical of the Middle East and North Africa steppes [1]. *A. herba-alba* is describe as greenish-silver herb and grows to length reach 20-40 cm and it is a chamaeophyte (i.e. buds of plant lead to new growth and branch every year are borne near to the earth) [2]. *A. herba-alba* possesses a therapeutic features and medicinal properties. It was utilized in each traditional and medicine modern medicine [3]. *A. herba-alba* have hypoglycemic activity [4], anticancer activity [5], anti-angiogenic activity [6], insecticidal [7], diuretic properties [8], anti-inflammatory activity [9]. Various studies were reported anti-diabetic properties, antimicrobial activity, and enhancement anti-oxidant state, and spasmolytic properties of *A. herba-alba* extracts and essential oils [10]. Enterobacter cloacae are defining as a part of normal flora of the digestive tract and distributed in different environments. as most family members of Enterobacteriaceae, this bacteria is able of causing opportunistic infections in hospitalized patients and elderly patients [11].

Materials and methods

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Sample collection of bacteria

Fecal samples were collected, at period June to November 2019, from buffalo calves which suffering from the diarrhea in Kirkuk city.

Culture

The feces samples after collection were cultured on MacConkey agar at 37 C°/24hrs. Then *Enterobacter* was identified according to colonies properties and biochemical tests [12].

Extraction of bacteria cell wall

The cell wall of E. cloacae was extracted according to method of [13], after that estimated content of carbohydrate in the extracted according to method of [14], and measure the content of protein content according to [15].

Aqueous extraction of *A. herba-alba*

50gm powder of A. herba-alba was extracted by using soxhlet extractor. The extractor collected in flask was evaporated in a rotary evaporator device. After about 96 hours, extract was obtained [16].

Animal model

20 male rats utilized in this work, (wt 150-190 gm with age 3-5 month). the rats kept on standard diet until begin the experiment.

Experimental design

20 male rats were utilize in this work as follow (five rats in each group):

- **A.** Rat received (orally) normal saline.
- **B.** Rat received (orally) 50u/ml of cell wall extract.
- **C.** Rat received (orally) 50u/ml of cell wall extract and treated with leaves extract (50mg/kg) for month.
- **D.** Rat received (orally) 50u/ml extract and treated with leaves extract 50mg/kg for month.

Measurements

MDA was estimated by using using spectrophotometer according to [17]. GSH was analyzed by spectrophotometer according to method of[18]. Catalase was estimated by utilizing procedure of Biovision kits.

Statistical analysis

The Data of present work were analyzed by utilizing Minitab program. A statistical difference between the average means of different groups was analyzed by utilizing ANOVA.

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Results & Discussion

MDA, GSH and catalase in liver extract

MDA (2.32 ± 0.21), GSH (0.311 ± 0.031) catalase (0.93 ± 0.04) in rats of second group show high significant increase (MDA) and decrease (GSH) ($P< 0.05$) compare with control rats (1.59 ± 0.11; 0.438 ± 0.023 and 1.33 ± 0.18 respectively). MDA (1.63 ± 0.12; 1.55 ± 0.17 respectively) and GSH (0.428 ± 0.033; 0.442 ± 0.042 respectively) and catalase (1.26 ± 0.14; 1.39 ± 0.1 respectively) third and fourth groups in show no significant changes ($P < 0.05$) compare with control rats as shown in figure (1).

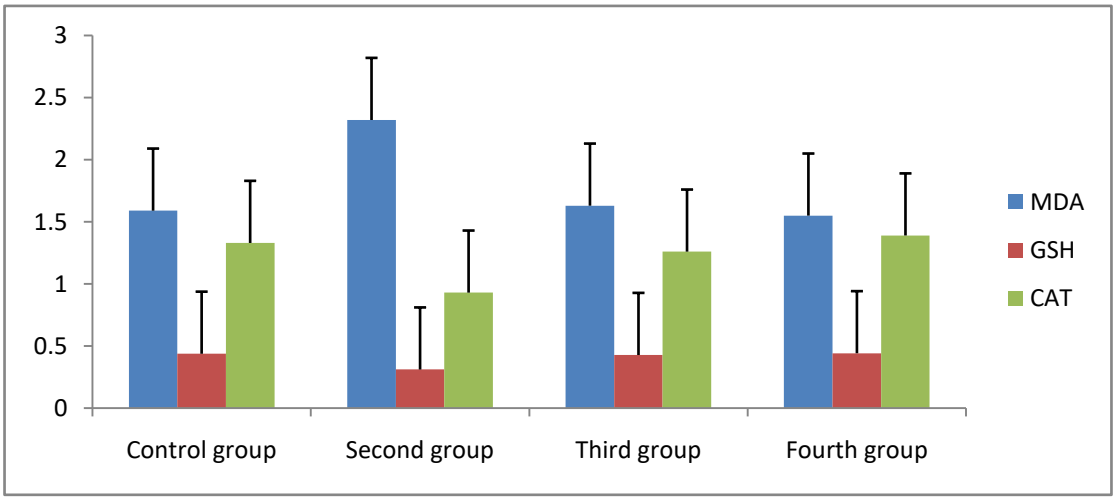

Figure (1): The levels of MDA, GSH and catalase in liver extract of the groups

The current findings demonstrate that the cell wall of enterobacter lead to increse levels of MDA and decrease GSH and catalase. Whereas, Al-Saffar [19] referred that Enterobacteriaceae lead to increase reactive oxygen species (ROS) in urinary organs and increase the levels of MDA in patients with Enterobacteriaceae infections that is in agrement with results of present study. the present study show *A. herba-alba* extract has antioxidant activity, AL-Rajab et al, [20] referred *A. herba-alba* extract has antioxidant activity due to contain alkaloids ,tannins, flavonoids, Saponins and phenolic. *A. herba-alba* extract has flavonoids [16], Flavonoids and phenolics are well known for their antioxidant activity and we know that Antioxidants are specific compounds that protect human, animal and plant cells against the damaging effects of free radicals in addition an imbalance between antioxidants and free radicals results in oxidative stress, will lead to cellular damage [21-24].

Kidney tissue

Histological examination show normal structure of glomerulus and convolute tubules in control group (fig: 2). In second (infected) group section kidney show

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damage glomerulus, endothelial desquamation of convolute tubules with hemorrhage and fibrosis (fig: 3). After treatment, in third and fourth groups the sections of kidney show semi-normal structures of tissue (fig: 4-5). the results of present study show that the cell wall of enterobacter has a toxic effect of kidney tissue, these results is in agrement with [11] that referred enterobacter lead to different lesions including inflammatory cells infiltration in the interstitial tissue, edema, degeneration cells and hemorrhage. present study show a potential activity to treatment that induced by cell wall of E. *cloacae* Iriadam et al, [22-23] referred that Artemisia herba-alba has been important role to decrease the levels of creatinine and urea in diabetic rabbits, they suggest its activity back to its antioxidant properities.

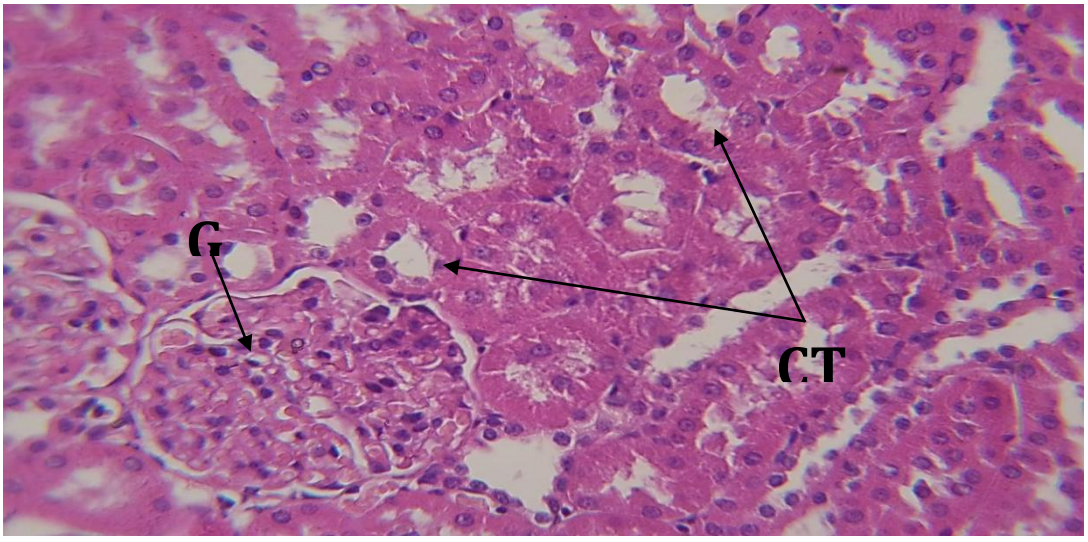

Figure (2): kidney of control group demonstrate normal structure of glomerulus (G) and convolute tubules (CT) H&E X400.

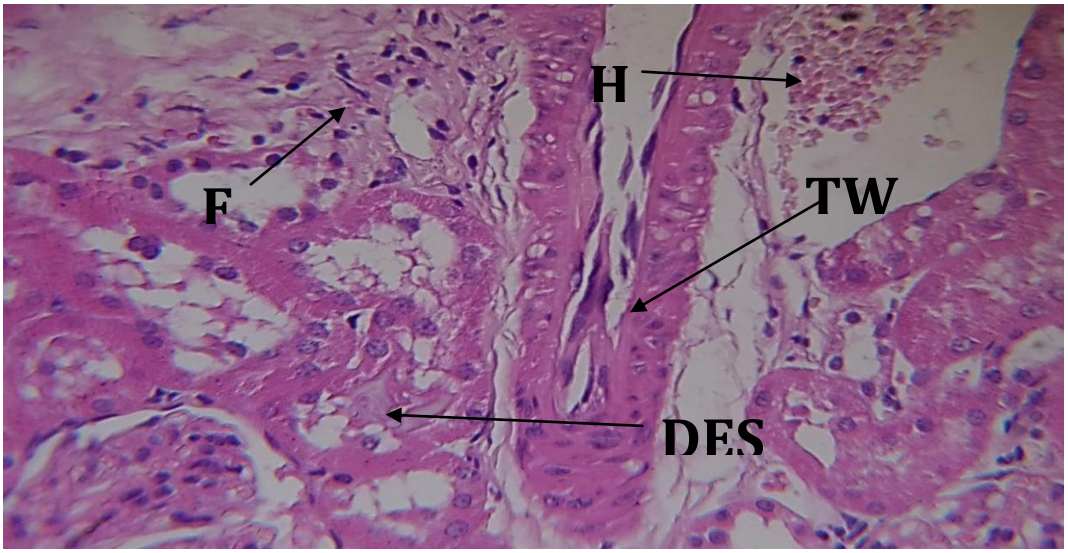

Figure (3): kidney of second group demonstrate thickening wall of blood vessels (TW), endothelial desquamation (DES), hemorrhage (H) and fibrosis (F) H&E X400.

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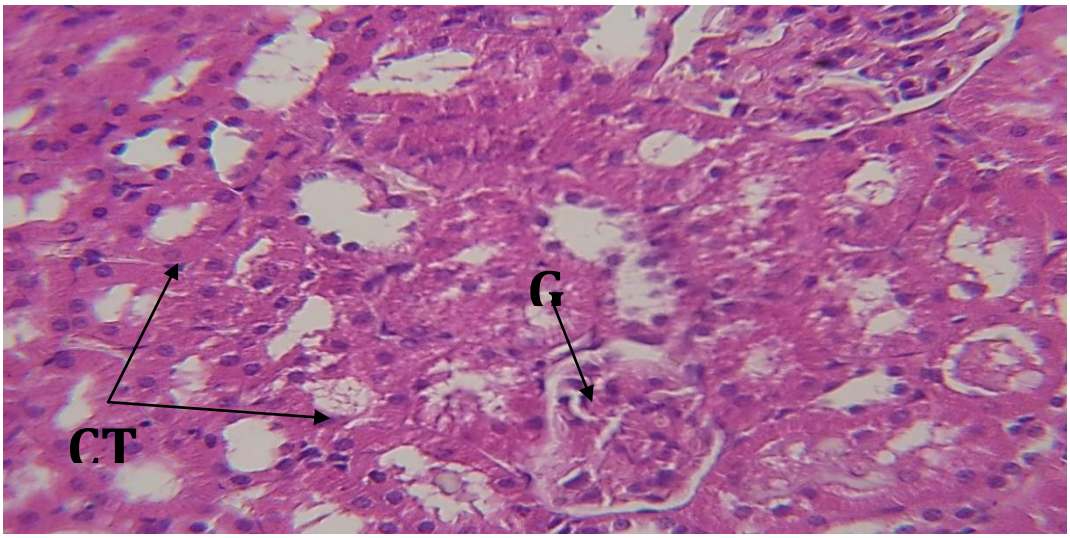

Figure (4): kidney of third group demonstrate glomerulus (G) and convolute tubules (CT) H&E X400.

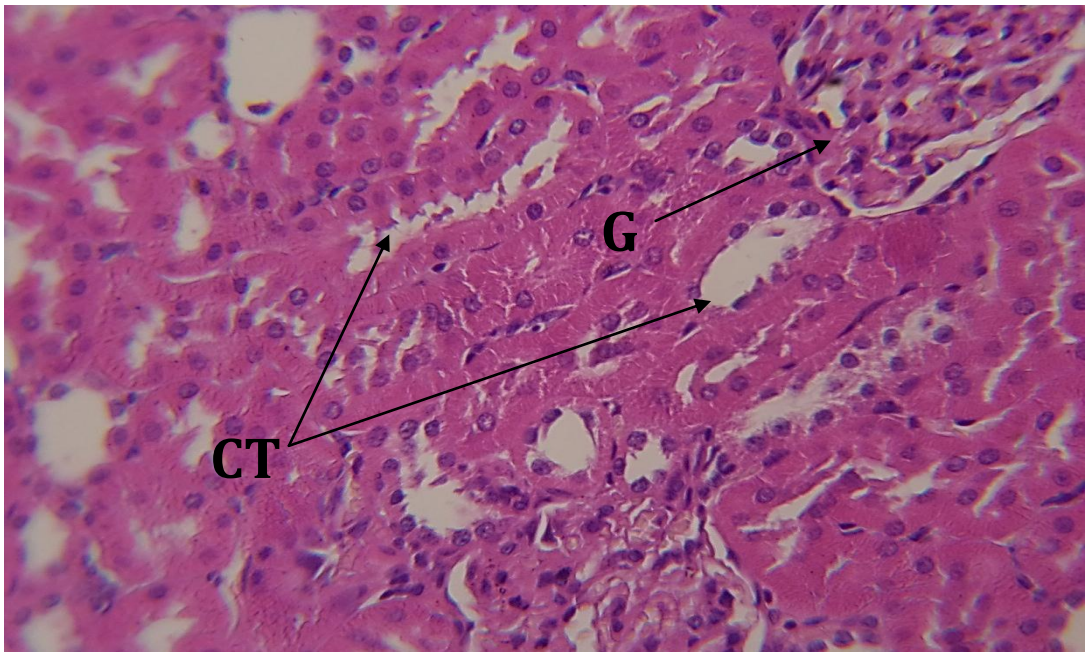

Figure (5): kidney of third group demonstrate glomerulus (G) and convolute tubules (CT) H&E X400.

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